

WHAT IS CLAIMED IS:

1. A method, comprising:

obtaining a signal indicative of an image;

forming an original histogram indicative of the signal,

said histogram including information indicative of numbers of dynamic range levels in the signal;

forming a mapping function, which relates each dynamic range level to positions of peaks in the original histogram; and scaling said original histogram based on said mapping function.

2. A method as in claim 1, wherein said mapping function forms a curve which has areas of highest slope near said peaks in said original histogram.

3. A method as in claim 1, wherein there are two of said peaks.

4. A method as in claim 2, wherein said forming a mapping function comprises determining center portions of said peaks, and characterizing dynamic range levels based on their relationship with said center portions of said peaks.

5. A method as in claim 4, further comprising determining widths of peak areas in said original histogram, and weighting based on said widths of said peak areas.

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6. A method as in claim 1, further comprising forming a new histogram based on said scaling, and displaying an image based on said new histogram.

7. A method as in claim 1, wherein said obtaining an image comprises using an active pixel sensor to obtain an image.

8. A method as in claim 6, wherein said mapping function is monotonous.

9. A method as in claim 1, wherein said dynamic range levels are gray scale levels, and said forming a mapping function comprises forming a curve which is based on the equation

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$$f(g) = \frac{-1 + \exp \frac{g - loc1}{w1}}{1 + \exp \frac{g - loc1}{w1}} + \frac{-1 + \exp \frac{g - loc2}{w2}}{1 + \exp \frac{g - loc2}{w2}}$$

, where loc1 and w1 are respectively center points and widths of a first peak, and loc2 and w2 are respectively center points and widths of a second peak.

10. A method as in claim 9, wherein said scaling comprises scaling the mapping curve according to

$$m(g) = (2^n - 1) \times \frac{f(g) - f(\min(g))}{f(\max(g)) - f(\min(g))}$$

where f(g) is the mapping curve, and n is the number of grey levels to which the mapping curve is to be scaled.

11. A method as in claim 1, wherein said scaling comprises scaling the mapping curve according to

$$m(g) = (2^n - 1) \times \frac{f(g) - f(\min(g))}{f(\max(g)) - f(\min(g))}$$

Where f(g) is the mapping curve, and n is the number of dynamic range levels to which the mapping curve is to be scaled.

12. A method as in claim 6, wherein said mapping function has a form that preserves relative brightnesses of a transformed image.

13. A method as in claim 12, wherein the new histogram has peaks in proportional locations to those in the original histogram, and a relationship between heights of said peaks of the new histogram is the same as a relationship between heights of peaks in the original histogram.

14. An apparatus, comprising:
 an image acquisition element, obtaining an original signal indicative of an image of a scene; and
 a processor, modifying said original signal to produce a modified signal, wherein the modified signal has fewer levels of dynamic range than the original signal, said processor operating by calculating an original image histogram, calculating a mapping function for the original image histogram which comprises a monotonous function having changes in said function which occur predominately at areas of peaks in said original image histogram, and forming a new compressed histogram based on said mapping function.

15. An apparatus as in claim 14, wherein said image acquisition device includes an active pixel sensor.

~~16. An apparatus as in claim 14, wherein said processor~~
forms a mapping curve which has areas of highest change near
said areas of peaks in the image histogram.

5 17. An apparatus as in claim 16, wherein there are two of
said peaks.

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as
18. An apparatus as in claim 16, wherein there are n of
said peaks.

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19. An apparatus as in claim 14, wherein said mapping
function depends on center portions of said peaks and widths of
said peaks.

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20. ~~An apparatus as in claim 19, wherein said processor~~
carries out said mapping function by comparing a current gray
level with a level at a peak.

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20 21. An apparatus as in claim 20, wherein said processor
forms said mapping function by weighting said function using
said widths.

22. An apparatus as in claim 14, further comprising a display device, having the capability of displaying n levels, where n is less than a number of levels in the original signal.

5 23. A method, comprising:
obtaining a higher dynamic range signal;
forming a histogram between components of the signal indicative of dynamic range levels in the signal, and numbers of those dynamic range levels;
finding peaks in said histogram; and
transforming said histogram into a modified histogram which keeps a similar specified relationship between said peaks and which represents a lower dynamic range signal.

15 24. A method as in claim 23, wherein said transforming comprises forming a mapping function based on the original histogram, and using said mapping function to form a modified histogram.